

Union of Soviet Socialist Republics (USSR)	DESCRIPTION OF AN INVENTION FOR WHICH A PATENT IS PENDING	(11) 995783
[insert emblem]	(61) Supplemental to inventor's certificate –	
State Committee on Inventions and Discoveries of the USSR	(22) Filed on 7/21/80 (21) 2960028/28-13 in association with application No. – (23) Priority – Published on 2/15/83, Bulletin No. 6 Description publication date 2/15/83	(51) Int. Cl. ³ A 61 F 9/00 (53) UDC 615.471: :616.8-084-78 (088.8)

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(54) A DEVICE FOR DRUG ELECTROPHORESIS IN OCULAR TISSUE

The invention at hand is related to the field of medical hardware, or more precisely to devices for the performance of physical therapy, and can be used in ophthalmology.

A device for drug electrophoresis in ocular tissue already exists that contains a blepharostatic attachment with a drug pan and an electrode [1].

However, when this device is used, the drugs affect not only the pathologically altered ocular tissues, but the healthy tissues of the eye as well, thereby leading to the deterioration of the latter's structure.

The closest to the device proposed herein as far as technical essence is a device for drug electrophoresis in ocular tissue that contains a blepharostatic attachment fashioned in the form of a flexible annular suction cup and an electrode [2].

However, this device does not have the ability to treat the drainage system of the eye.

The purpose of the invention at hand is to afford the opportunity of treating the eye's drainage system with allowance for the individual specifics of a patient.

This stated objective is achieved by virtue of the fact that within a device for drug electrophoresis in ocular tissue that contains a blepharostatic attachment fashioned in the form of a flexible annular suction cup and an electrode mounted so as to facilitate movement in the vertical plane, this electrode is fashioned in the form of a ring consisting of several segments which have been installed in such a manner that the distance between them can be varied. Here, the thickness of the suction cup's outer wall has been selected with allowance for the possibility of altering its angular position relative to the patient's eyeball.

An overall view of the subject device is shown in Fig. 1. The A-A cross-section of Fig. 1 is shown in Fig. 2.

This device contains a blepharostatic attachment, 1, fashioned in the form of a flexible annular suction cup and an electrode that consists of three segments, 2, each of which is connected by flexible wire pin, 3. The latter are loosely fixed in three guide bushings, 4, that are situated in a casing, 5, the upper section of which has an outer threading. The casing, 5, is mounted in a centering bushing, 6, that is located on the blepharostatic attachment, 1. A nut, 7, with an inner threading and a restraining arm, 8, is installed in the upper section of the housing, 5. The free ends of the pins, 3, are secured in a holder, 9.

The thickness of the outer wall, 10, of the suction cup is selected with allowance for the possibility of altering its angular position relative to the patient's eyeball [approximately 0.35 millimeters (mm)].

The subject device functions in the following manner.

Based on data from a clinical examination, it is possible to reach a conclusion with a specific degree of accuracy concerning the position of the drainage system as a whole and to express this value in linear units (in the form of diameter up to one-tenth of a millimeter). The contact surface of the blepharostatic attachment, 1, is placed on the eyeball (following installation anesthesia with 0.25% tetracaine hydrochloride) and suction is created through a coupling, 11, using a pressure-gauge system with a force of 0.3-0.4 mm of water column, thereby ensuring the stability of the device as a whole and precluding random patient eye movements. An absorbent pad or 3-5% drug-containing agar cast in the form of two to three ring segments is positioned in the projection of the drainage system. The drug-containing agar cast is prepared beforehand by means of pouring it into special molds that consist of rings of different diameters. The centering bushing, 6, is tightly fitted into the suction cup, 1. The pins, 3, are extended and the requisite distance (as far as diameter) between the segments, 2, of the active electrode is set (they are shifted in the sagittal plane) by means of moving the nut, 7. The optimum adaptation of the segments, 2, to different eyes is accomplished by moving the housing, 5, within the centering bushing, 6. It is possible to avoid curvature mismatch between the eyeball and the contact surface of the flexible suction cup, 1, in different patients, by altering the angle of slope of the suction cup's outer wall, 10. A passive electrode (not shown) is attached to the patient's neck.

The proposed device affords the opportunity of treating the drainage system of the eye with allowance for the individual specifics of a patient, thereby making it possible to enhance the effectiveness of treatment due to the most precise possible introduction of the drugs, as well as to reduce the treatment time frame. In addition, the use of the proposed device results in a minimum of a 20-fold savings in drugs.

Patent Claims

The device at hand for drug electrophoresis in ocular tissue, which contains a blepharostatic attachment that is fashioned in the form of a flexible annular suction cup, as well as an electrode that is positioned so as to facilitate movement in the vertical plane, is distinctive in that, for the purpose of affording the opportunity of treating the drainage system of the eye with allowance for the individual specifics of a patient, the electrode used is fashioned in the form of a ring that consists of several segments, which are positioned so as to facilitate the alteration of the distance between them. Here, the thickness of the suction cup's outer wall is selected with allowance for the possibility of altering its angular position relative to the patient's eyeball.

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Sources of Information Taken Into Account During the Expert Evaluation

1. USSR Inventor's Certificate No. 591786, Cl. A 61 F 9/00, 1976.
2. USSR Inventor's Certificate No. 2911778/28-13, Cl. A 61 F 9/00, 1980 (the prototype).

[insert Fig. 1]

Fig. 1

[insert Fig. 2]

Fig. 2